codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

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CX 5/35 **CL 2004/42-FFP**
September 2004

TO: Codex Contact Points
Interested International Organizations

FROM: Secretary, Codex Alimentarius Commission
Joint FAO/WHO Food Standards Programme
FAO, 00100 Rome, Italy

SUBJECT: **Code of Practice for Fish and Fishery Products: Draft Section on Aquaculture**

Request for comments at Step 6

DEADLINE: **30 November 2004**

COMMENTS: To:
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The 25th Session of the Committee on Fish and Fishery Products advanced to Step 5/8 of the Procedure the Proposed Draft Sections on Aquaculture and on Quick Frozen Coated Fish Products in the *Code of Practice for Fish and Fishery Products* (ALINORM 04/27/18, Appendix V).

The 27th Session of the Codex Alimentarius Commission adopted the section on Quick Frozen Coated Fish Products for inclusion in the *Code of Practice on Fish and Fishery Products.*

Some delegations expressed the view that the section on Aquaculture should not be adopted at Step 5/8 and required further consideration in view of its importance and possible impact on aquaculture production. After some further discussion, the Commission adopted the Proposed Draft Section on Aquaculture at Step 5 (ALINORM 04/27/41, paras. 38-43).

The Draft Section on Aquaculture is hereby circulated for comments at Step 6 and consideration by the 27th Session of the Committee on Fish and Fishery Products (Cape Town, South Africa, 28 February- 4 March 2005).

Governments and international organizations wishing to provide comments should do so in writing, preferably by email, to the above addresses **before 30 November 2004**.

CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS

DRAFT SECTION ON AQUACULTURE

(At Step 6 of the Procedure)

SECTION 2. DEFINITIONS

2.2 AQUACULTURE

Aquaculture	means the farming during part or the whole of their life cycle of all aquatic animals, except mammalian species, aquatic reptiles and amphibians intended for human consumption, but excluding species covered in section 7 of this code. These aquatic animals are hereafter referred to as "fish" for ease of reference in section 2.2 and section 6;
Aquaculture Establishment	is any premises for the production of fish intended for human consumption, including the supporting inner infrastructure and surroundings under the control of the same management;
Chemicals	includes any substance either natural or synthetic which can affect the live fish, its pathogens, the water, equipment used for production or the land within the aquaculture establishment;
Colouring	means obtaining specifically coloured fish flesh by incorporating into the fish food a natural or artificial substance or additive approved for this purpose by the agency having jurisdiction;
Diseased Fish	means a fish on or in which pathological changes or other abnormalities are apparent;
Extensive farming	means raising fish under conditions or little or incomplete control over such factors as water flow, number and weight of species raised, and low quality and quantity of nutrient inputs;
Feed Additives	means chemicals other than nutrients for fish which are approved for addition to their feed;
Fish farm	is an aquaculture production unit (either land-or water based); usually consisting of holding facilities (tanks, ponds, raceways, cages), plant (buildings, storage, processing), service equipment and stock;
Fish Feed	means fodder intended for fish in aquaculture establishments, in any form and of any composition;
Good Aquaculture (or Good Fish Farming) Practices	are defined as those practices of the aquaculture sector that are necessary to produce quality food products conforming to food laws and regulations
Harvesting	Operations involving taking the fish from the water

Intensive farming	means raising fish under conditions of complete control over such factors as external complete diet nutrient inputs and operation practices, where growth is completely dependent on external provision of nutritionally complete high quality diet.
Official Agency Having Jurisdiction	means the official authority or authorities charged by the government with the control of food hygiene (sometimes referred to as the competent authority) as well as/or with sanitation in aquaculture;
Pesticide	means any substance intended for preventing, destroying, attracting, repelling or controlling any pest including unwanted species of plants or animals during the production, storage, transport, distribution and processing of food, agricultural commodities, or animal feeds or which may be administered to animals for the control of ectoparasites. The term normally excludes fertilisers, plant and animal nutrients, food additives, and veterinary drugs;
Pesticide Residue	means any specified substance in food, agricultural commodities, or animal feed resulting from the use of a pesticide. The term includes any derivatives of a pesticide, such as conversion products, metabolites, reaction products, and impurities;
Residues	means any foreign substances including their metabolites, which remain in fish prior to harvesting as a result of either application or accidental exposure.
Semi-intensive farming	means raising fish under conditions of partial control over dietary nutrient inputs by including external fertilizer and/or supplementary diet nutrient inputs, whereby fish growth is dependent upon the consumption of endogenously supplied live food organism and externally supplied feed as supplementary source of dietary nutrients.
Stocking density	is the amount of fish stocked per unit of area or volume
Veterinary Drug	means any substance applied or administered to any food-producing animal, such as meat or milk-producing animals, poultry, fish or bees, whether used for therapeutic, prophylactic or diagnostic purposes or for modification of physiological functions or behaviour;
Withdrawal Time	is the period of time necessary between the last administration of a veterinary drug to fish, or exposure of these animals to a veterinary drug, and harvesting of them to ensure that the concentration of the veterinary drug in their edible flesh intended for human consumption, complies with the maximum permitted residue limits..

SECTION 6 - AQUACULTURE PRODUCTION

Preamble

Aquaculture establishments should operate in a responsible way such that they comply with the recommendations of the Code of Conduct for Responsible Fisheries (FAO. Rome. 1995) in order to minimize any adverse impact on human health and environment including any potential ecological changes.

Fish farms should operate effective fish health and welfare management. Fry and fingerlings should be disease free and should comply with the OIE Codes of Practice (International Aquatic Animal Health Code, 6th Edition , 2003). Growing fish should be monitored for disease. When using chemicals at fish farms, special care should be exercised so that these substances are not released into the surrounding environment.

Whilst the fish health, environment, and ecological aspects are important considerations in aquaculture activities, this section focuses on food safety and quality aspects.

This Section of the Code applies to industrialised and commercial aquaculture production, producing all aquatic animals, except mammalian species, aquatic reptiles and amphibians for direct human consumption, but excluding bivalve molluscs covered in section 7 of the code, hereafter referred to as "fish"] (1) that are intended for direct human consumption. Such intensive or semi-intensive aquaculture systems use higher stocking densities, stock from hatcheries, use mainly formulated feeds and may utilise medication and vaccines. This Code is not intended to cover extensive fish farming systems that prevail in many developing countries or integrated livestock and fish culture systems. This section of the code covers the feeding, growing, harvesting and transport stages of aquaculture production. Further handling and processing of fish are covered elsewhere in the code.

In the context of recognising controls at individual processing steps, this section provides examples of potential hazards and defects and describes technological guidelines, which can be used to develop control measures and corrective action. At a particular step only the hazards and defects, which are likely to be introduced or controlled at that step, are listed. It should be recognised that in preparing a HACCP and/or DAP plan it is essential to consult Section 5 which provides guidance for the application of the principles of HACCP and DAP analysis. However, within the scope of this Code of Practice it is not possible to give details of critical limits, monitoring, record keeping and verification for each of the steps since these are specific to particular hazards and defects.

The Example flow diagram will provide guidance to some of the common steps in aquaculture production.

This flow chart is for illustrative purpose only. For implementation of HACCP principles, a complete and comprehensive flow chart has to be drawn up for each product. References correspond to relevant Sections of the Code.

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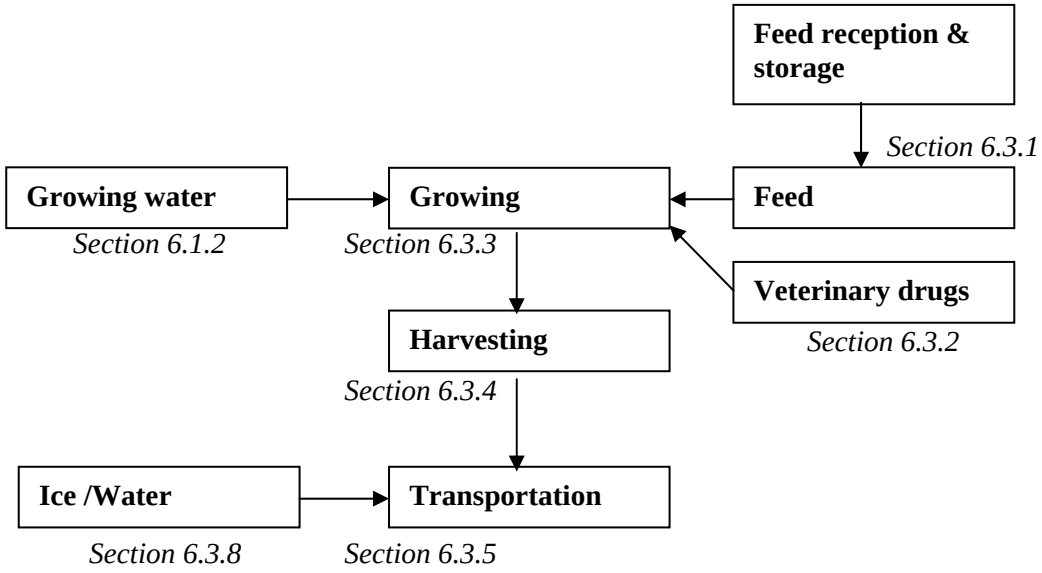

Figure 6.1 Example of a flow chart for aquaculture production

6.1 GENERAL

The general principles in Section 3 apply to aquaculture production, in addition to the following:

6.1.1 Site selection

- The siting, design and construction of fish farms should follow principles of good aquaculture practice, appropriate to species.
- The physical environment with regard to temperature, current and depth should also be checked since different species have different environmental requirements.
- Fish farms should be located in areas where the risk of contamination by chemical, physical or microbiological hazards is minimal and where sources of pollution can be controlled.
- Soil for the construction of earthen ponds should not contain such concentrations of chemicals and other substances, which may lead to the presence of unacceptable levels of contamination in fish.
- Ponds should have separated inlets and discharge canals, so that water supplies and effluent are not mixed.
- Water inlets and outlets to ponds should be screened to prevent the entrance of unwanted species.
- Fertilizers, liming materials or other chemicals and biological materials, should be used in accordance with good aquaculture practice.
- All sites should be operated in an environmentally acceptable way as to not impact human health.

6.1.2 Growing Water Quality

- The water in which fish are raised should be suitable for the production of products which are safe for human consumption.
- Fish farms should not be sited where there is a risk of contamination of the water in which fish are reared.
- Appropriate design and construction of fish farms should be adopted to ensure control of hazards and prevention of water contamination.

6.1.3 Source of Fry and Fingerlings

- The source of postlarvae, fries and fingerlings should be such to avoid the carryover of potential hazards into the growing stocks.

6.2 IDENTIFICATION OF HAZARDS AND DEFECTS

Consumption of fish and fishery products is associated with a variety of human health hazards. Broadly the same hazards are present in aquaculture products as in corresponding varieties caught in the wild (Section 4.1). The risk of harm from a particular hazard might be increased, under some circumstances, in aquaculture products compared with fish caught in the wild - for instance the presence of residues of veterinary drugs. High stocking densities, compared with the natural situation, might increase the risk of cross-infection of pathogens within a population of fish. On the other hand, farmed fish can also present a lower risk of harm. In systems where the fish receive artificial feeds, the risks associated with transmission of hazards through the food consumed by the fish could be reduced. For example, infection with nematode parasites is absent from, or very much reduced in, farmed salmon compared with salmon caught in the wild. Raising fish in cages in the marine environment poses few hazards and low risks. In closed recirculation systems hazards are even further reduced. In those systems, the water is constantly refreshed and reused and water quality is controlled within safe measures.

6.2.1 Hazards

Aquaculture products possess broadly the same hazards that are present in corresponding varieties caught in the wild (Section 5.3.3.1). Potential hazards that are specific to aquaculture products include: residues of veterinary drugs in excess of recommended guidelines and other chemicals used in aquaculture production, contamination of faecal origin where the facilities are close to human habitation or animal husbandry.

6.2.2 Defects

The same defects are present in aquaculture products as in corresponding varieties caught in the wild (Section 5.3.3.1). A defect which may occur is objectionable odours/flavours . During transport of live fish, it is important to reduce stress, as stressing fish can lead to deterioration in quality. Also, care should be taken to minimise physicaldamage to fish as this can lead to bruising.

6.3 PRODUCTION OPERATIONS

6.3.1 Feed Supply

Feeds used in aquaculture production should comply with the Codex 'Draft Code of Practice of Good Animal Feeding' (under development in the Ad Hoc Intergovernmental Task Force on Animal Feeding).

Potential Hazards: *Chemical contamination, mycotoxins and microbiological pathogens .*

Potential Defects: *Decomposed feeds, fungal spoilage*

Technical Guidance:

- Feed and fresh stocks should be purchased and rotated and used prior to the expiry of their shelf life.
- Fish feeds should be stored in cool and dry areas to prevent spoilage, mould growth and contamination.
- Feed ingredients should not contain unsafe levels of pesticides, chemical contaminants, microbial toxins, or other adulterating substances.
- Industrially produced complete feeds and industrially produced feed ingredients should be properly labelled. Their composition must fit the declaration on the label and they should be hygienically acceptable.
- Ingredients should meet acceptable, and if applicable, statutory standards for levels of pathogens, mycotoxins, herbicides, pesticides and other contaminants which may give rise to human health hazards.
- Only approved colours of the correct concentration should be included in the feed.
- Moist feed or feed ingredients should be fresh and of adequate chemical and microbiological quality.
- Fresh or frozen fish, fish silage, offal from fish should reach the fish farm in an adequate state of freshness.
- Rejects from animal slaughterhouses must be processed by an approved procedure, prior to acceptance.
- Feed which is compounded industrially or at the fish farm, should contain only such additives, growth promoting substances, fish flesh colouring agents; anti-oxidising agents, caking agents or veterinary drugs which are permitted for fish by the official agency having jurisdiction.
- Products should be registered with the relevant national authority as appropriate.
- Storage and transport conditions should conform to the specifications on the label.
- Veterinary drug and other chemical treatments should be done in accordance with recommended practices and comply with national regulations.
- Farmers should follow manufacturers' instructions on the use of veterinary drugs or medicated feeds.

- Product tracing of all feed ingredients should be assured by proper record keeping.

6.3.2 Veterinary Drugs

Potential Hazards: *Rresidues of veterinary drugs*

Potential Defects: *Unlikely*

Technical Guidance:

- All veterinary drugs for use in fish farming should comply with national regulations and international guidelines (in accordance with the Recommended International Code of Practice for Control of the Use of Veterinary Drugs (CAC/RCP 38-1993) and the Codex Guidelines for the Establishment of a regulatory programme for control of veterinary drug residues in foods (CAC/GL 16-1993)).
- Prior to administrating veterinary drugs, a system should be in place to monitor the application of the drug to ensure that the withdrawal time for the batch of treated fish can be verified.
- Veterinary drugs or medicated feeds should be used according to manufacturers' instructions, with particular attention to withdrawal periods.
- Products should be registered with the appropriate national authority.
- Products should only be prescribed or distributed by personnel authorised under national regulations.
- Storage and transport conditions should conform to the specifications on the label.
- Control of diseases with drugs should be carried out only on the basis of an accurate diagnosis
- Records should be maintained for the use of veterinary drugs in aquaculture production.Pre-slaughter control is a method of controlling drug residues in fish. If the average drug concentration in tested fish is above the MRL, (or in some countries, by an industry imposed lower level), slaughter of the batch has to be postponeduntil the fish complies with the MRLA post slaughter control should reject all fish that do not comply with the requirements set for veterinary drug residues by the Codex Alimentarius.

6.3.3 Growing

Potential Hazards: *Microbiological pathogens and chemical contamination*

Potential Defects: *Abnormal colour, muddy flavour, physical damage*

Technical Guidance:

- Source of postlarvae, fries and fingerlings should be controlled to assure healthy stock.
- Stocking densities should be based on culture techniques, fish species, size and age, carrying capacity of the fish farm, anticipated survival and desired size at harvesting.
- Dead or diseased fish should be disposed in a sanitary manner that will discourage the spread of disease and investigate cause of death.
- Good water quality should be maintained by using stocking and feeding rates that do not exceed the carrying capacity of the culture system.
- Growing water quality should be monitored regularly, so as to identify potential hazards and defects.
- The fish farm should have a management plan that includes a sanitation programme, monitoring and corrective actions, defined fallowing periods, appropriate use of agrochemicals, verification procedures for fish farming operations and systematic records should be kept.
- Equipment such as cages and nets should be designed and constructed to ensure minimum damage during the growing stage.

6.3.4 Harvesting

Potential Hazards: *Unlikely*

Potential Defects: *Physical damage, physical/biochemical change due to stress of live fish*

Technical Guidance:

- Appropriate harvesting techniques should be applied to minimise physical damage and stress.
- Live fish should not be subjected to extremes of heat or cold or sudden variations in temperature.
- Fish should be free from excessive mud and weed soon after being harvested by washing it with clean seawater or fresh water under suitable pressure.
- Fish should be handled in a sanitary manner according to the guidelines in Section 4 of the Code..
- Harvesting should be rapid so that fish are not exposed unduly to high temperatures.

6.3.5 Holding and Transportation

Potential Hazards: *microbiological pathogens and chemical contamination*

Potential Defects: *physical damage, physical/biochemical change due to stress of live fish*

Technical Guidance:

- Quality defects can occur in fish that are subjected to stress.
- Fish should be transported without undue delay.
- Equipment for the transport of live fish should be designed for rapid and efficient handling without causing physical damage or stress.
- Records for transport of fish should be maintained to ensure full product tracing.
- Fish should not be transported with other products which might contaminate them.

6.3.6 Storage and transport of live fish

This section is designed for the storage and transportation of live fish originating from aquaculture or capture.

Potential Hazards: *microbiological pathogens, biotoxins, chemical contamination (e.g. oil, cleaning and disinfecting agents)*

Potential Defects: *Dead fish, physical damage, off flavours, physical/biochemical change due to stress of live fish*

Technical Guidance:

- Only healthy and not damaged fish should be chosen for storage and transport of live fish. Damaged, sick and dead fish should be removed before introduction to the holding or conditioning tanks.
- Holding tanks should be checked regularly during storage and transportation. Damaged, sick and dead fish should be removed immediately when found. (2)
- Clean water utilised to fill holding tanks, or to pump fish between holding tanks, or for conditioning fish, should be similar in properties and composition to the water from where the fish was originally taken to reduce fish stress.
- Water should not be contaminated with either human sewage or industrial pollution. Holding tanks and transportation systems should be designed and operated in a hygienic way to prevent contamination of water and equipment.
- Water in holding and conditioning tanks should be well aerated before fish is transferred into them.
- Where seawater is used in holding or conditioning tanks, for species prone to toxic algae contamination, seawater containing high level of cell concentrations should be avoided or filtered properly.

- No fish feeding should occur during storage and transport of live fish. Feeding will pollute water of holding tanks very quickly.
- Material of holding and conditioning tanks, pumps, filters, piping, temperature control system, intermediate and final packaging or containers should not be harmful to fish or present hazards to humans.
- All equipment and facilities should be cleaned and disinfected regularly and as needed.

6.3.7 Live fish stored and transported at ambient temperature

Potential Hazards: *microbiological pathogens, biotoxins, chemical contamination (e.g. oil, cleaning and disinfecting agents)*

Potential Defects: *Dead fish, physical damage, off flavours , physical/biochemical change due to stress of live fish*

Technical Guidance:

- Depending on the source of water, requirements of the species and time of storage and/or transport, it could be necessary to re-circulate the water and filter it through mechanical and/or biofilters.
- Water intake of holding tanks on board of vessels should be located so as to avoid contamination from vessel's sewage, waste and engine cooling discharge. Pumping of water should be avoided when the vessel comes into harbour or sailing through waters near sewage or industrial discharges. Equivalent precautions should be adopted for water intake on land.
- Facilities for storing and transportation (holding tanks) of live fish should be capable to:
  - maintain the oxygenation of water in the holding tanks through either, continuous water flow, direct oxygenation (with oxygen or air bubbling), or regularly and as needed changing of the water of the holding tank;
  - maintain the temperature of storage and transport, for species sensitive to temperature fluctuations. It may be necessary to insulate the holding tanks and install a temperature control system;
  - keep water in reserve which might be needed in case the holding tank should drain. The volume in fixed facilities (storage) should be at least of the same volume of the total holding tanks in operation. The volume in land transport facilities should be at least capable to compensate water for evaporation, leakage, purges, filter cleaning and eventual mixing of water for control purposes;
- It could be necessary to separate fish in individual tanks or tie them in ways that prevent damage, particularly, in the case of species that exhibit phenomena like cannibalism, strong territoriality or hyperactivity when under stress (an alternative method is reduction of temperature see 6.3.8).

6.3.8 Live fish stored and transported at low temperatures

Potential Hazards: *microbiological pathogens, biotoxins, chemical contamination (e.g. oil, cleaning and disinfecting agents)*

Potential Defects: *Dead fish, , physical damage, off flavours, physical/biochemical change due to stress of live fish*

Technical Guidance:

- Conditioning of the fish at low temperatures should be done according to the characteristics of the species (minimum temperature, cooling rate, water/humidity requirements, packaging conditions). Conditioning is a biological operation to reduce the metabolic rate of the fishminimising the stress to them.
- The level of temperature to be reached should be in accordance with the species, transport and packaging conditions. There is a range of temperature in which fish do not exhibit or have reduced physical activity. The limit is attained at the temperature at which the metabolic rate of the fishis minimised without causing adverse effects to them (basal metabolic rate).

- When performing conditioning, only anaesthetics and procedures accepted by the regulations should be utilised.
- Conditioned fish should be packed without delay in proper insulated containers.
- Remaining water or water for use with packaging material for conditioned fish should be clean, of similar composition and pH to the water the fish was taken from, but to the temperature of storage.
- Water absorbent pads, shredded wood, wood shavings or sawdust and tying material that may be utilised for packaging conditioned fish should be clean, first use, free of possible hazards and be wet right at the time of packaging.
- Conditioned and packed fish should be stored or transported under conditions that assure proper temperature control.